

# *Reproduction and survival of black bears in northern California*

I bumped my headlamp against a ceiling of old burned and rotten wood which turned off the light and shrouded me in darkness. Lying quietly

*By Richard Callas*

inside a hollow log I could hear the gentle breathing of #3132, a sedated female black bear, and the nuzzling sounds of her cubs as they nursed several feet from me. I was in her den to remove a radio-transmitter collar she had worn for several years. Known as #3132 because of the small numbered tag in her ear, she is one of many radio-collared black bears being monitored by the Department of Fish and Game (DFG).

Our work that February morning began at the U.S. Forest Service Ash Creek Fire Station, located about 20 miles east of the historic town of McCloud in Siskiyou County. Wildlife biologists Fred Schmalenberger, Melissa Crew, and I double-checked the pile of gear needed to go "bear denning." Our equipment included snowshoes, shovels, back packs, flashlights, all weather



**Above, a DFG biologist checks a bear den. Right, listening at the den for sounds of activity inside.**

*DFG photos by Richard Callas*



**Left, bear den in the snow. Right, hibernating female with cub. DFG will monitor the females and their cubs to determine reproduction and survival rates.**

*DFG photos by Richard Callas.*

clothing, telemetry receivers, GPS units, and sedative to tranquilize bears.

After loading the gear into a 1970s Thiokol snowcat, we rumbled down snow-covered roads onto property owned by Bascom Pacific LLC and managed by David Marshall of Forest Systems in McCloud. Bascom Pacific, along with the Hancock Timber Resource Group, is one of several timberland managers cooperating in this study. Our progress was slow in the snowcat but the scenery was beautiful with the surrounding forest blanketed with fresh snow and Mount Shasta gleaming in the morning sun to the north. Although most bears were snug in their dens under several feet of snow, a

host of other animals were active in this area. It was not uncommon to cross the tracks of snowshoe hares, Douglas squirrels, deer, mountain lion, and pine marten as we searched for bear dens.

DFG has located radio-collared bears in winter many times over the years to study black bear reproduction and the characteristics of their dens in northern California. This project was initiated by DFG biologists Don Koch and Tim Burton about 10 years ago. Field work for this study has been delegated to a number of biologists over the years as Koch and Burton's other departmental responsibilities have grown. Don Koch is currently the regional manager and Tim Burton is the wildlife programs manager

in the DFG's Northern California-North Coast Region (Region 1).

Since 1992, we have equipped 71 black bears with radio-transmitter collars in our McCloud and Klamath study sites. The McCloud study area is located near the town of McCloud in south-central Siskiyou County. The Klamath study area is situated along the western edge of the Marble Mountain Wilderness, south of the town of Happy Camp. Black bears are abundant in this region of California and range over wide areas to exploit seasonal food sources.

In spring, grasses and forbs make up a substantial part of a bear's diet. In the summer and fall, shrub and tree-borne fruits comprise the bulk of their diet.







Animal protein is a smaller but important part of a bear's annual nutritional needs. Insects, rodents, larger mammals, and carrion are readily consumed when found. Adequate nutrition is critical to ensure successful reproduction and overwinter survival in dens.

By late fall and early winter black bears prepare to den for the winter. This process may take up to a month as they adapt physiologically to a period of winter dormancy. During hibernation, a bear's metabolism may be reduced by half, its body temperature may drop to 85 degrees, and its heart rate can range from 8-19 beats per minute. Adult bears typically do not eat, drink, defecate, or

urinate in their winter dens. Despite their adaptations for winter dormancy, they are easily aroused and on at least one occasion have bitten the flashlight held by one of DFG's researchers as he peered into a den.

Most bears monitored in this study denned in hollow trees and logs. However, there were substantial differences in the types of dens used by collared bears between the two study areas. At the Klamath study site, 88 percent of the bear dens found occurred in Douglas-fir, pine, or cedar trees that, on average, exceeded 50 inches in diameter at breast height. Of those dens, nearly half were high above the ground in natural tree cavities. Some

entrances to these dens were greater than 120 feet above the ground. Bear claw marks leading up the sides of these trees to the den entrance were readily visible and, judging by their number, these dens have been used for many years. Other dens found during this study were located in the hollow bases of standing trees and their entrances were frequently "plugged" by bears with rotten wood and duff.

The McCloud study site is primarily composed of land managed by private timber companies and the U.S. Forest Service. DFG's radio-collared bears in this area typically denned in hollow logs which were either cut and left in the

**Far left, Richard Callas's feet sticking out of a den being surveyed. Immediate left, Melissa Crew holds a new cub. Right, DFG biologists will take measurements and collect other data from their den surveys.**



*DFG photo far left by Melissa Crew. Photo immediate left by Richard Callas.*



forest during logging operations because they were unmerchantable or fell naturally. Dens in large diameter standing trees were relatively uncommon in the McCloud study site, presumably because they were less abundant compared to the Klamath study area. Dens in trees represented about 11 percent of the dens found, while 77 percent of the dens found occurred in hollow logs.

Black bears are very adaptable with respect to the types of dens they use throughout their range in north America. In the northern part of their range, bears use hollow trees, logs, and snow for security and insulation in winter. In the southeastern United States, cavities in trees or logs are also used but bears may also construct crude "nests" on the ground under thick cover.

Female black bears are sexually

mature at three to five years of age. Cubs are typically born in January and February and den with their mothers during their first and second winter of life. Cubs emerging from dens after their second winter, begin to live independently as their mother's come into breeding condition (estrus) that summer. This means that sows are typically bred and give birth to cubs every other year. Female bears that lose their cubs during the cub's first few months of life may breed that summer and give birth the following winter.

The period of peak productivity in an adult female black bear's life likely occurs when she is physiologically in her prime, nutritionally competent, and is experienced at rearing cubs. In our study, we monitored many females that produced cubs and they ranged in age from four to 20 years. Litter sizes

averaged 1.6 cubs per female. Mortality rates of those cubs was relatively high and approximately 60 percent may have died during their first year. Accidents, inadequate nutrition, disease, and predation are all causes of mortality in cubs. Cub mortality rates observed in this project were likely influenced by the abundance of bears in both study areas. Predation of cubs by adult male black bears is relatively common and has been well documented by researchers.

We determined birth and survival rates of bears in this study, in part, by locating female bears in their dens. Rich Anthes, DFG's warden pilot headquartered in Redding, has flown wildlife biologists Melissa Crew and Terri Weist over thousands of square miles of northern California in search of signals emitted from bear collars. Anthes is very proficient at finding collared bears,



**Clockwise from top - bear tracks, debris at entrance to a den, attempting to get a telemetry reading, den at the base of a tree, and collecting information at another den**





despite the difficulty of accurately pinning down their locations in dens under snow in steep mountainous terrain. We also use the skills of Steve De Jesus, a helicopter pilot with Landells Aviation, to further refine the locations of bear dens. The locations obtained by Anthes and De Jesus save hours of travel in the snowcat and on snowshoes to find dens.

The coordinates for #3132's den provided by Anthes and De Jesus allowed us to use the snowcat to get within a mile of her den. From there, we snowshoed and used hand-held telemetry receivers with directional antennas to guide us the rest of the way. After digging carefully through the snow to expose the entrance to the den, Fred Schmalenberger used a syringe mounted on the end of an aluminum pole to tranquilize #3132 to ensure it was safe to

enter her den.

As I removed #3132's radio-collar, I thought how fortunate we are to have been able to obtain a glimpse into her life and those of other bears collared during this study. She was born in January or February of 1991, and gave birth to six cubs from 1995 to 2000. Her two cubs born in 1995 did not survive their first year. However, both cubs born in 1998, survived to den with their mother the following winter. From 1995

to 2000, #3132 used six different dens in hollow logs. DFG will complete its analysis of information collected during this study to contribute to a better understanding of black bear ecology in northern California. 🐻

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*DFG photos by Richard Callas*